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| 10/786,152      | 02/26/2004  | Tatsuo Kobayashi     | 117867              | 6558             |

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EXAMINER

BENTON, JASON

ART UNIT PAPER NUMBER

3747

DATE MAILED: 02/08/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/786,152

Applicant(s)

KOBAYASHI ET AL. 

Examiner

Jason Benton

Art Unit

3747

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-17 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,5,11 and 15-17 is/are rejected.
- 7) ☒ Claim(s) 2-4,6-10 and 12-14 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 2/26/04.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_.

**DETAILED ACTION**

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1 and 16 are rejected under 35 U.S.C. 102(e) as being anticipated by Otterspeer et al.

The patent by Otterspeer et al. (6,619,241) shows a plurality of combustion chambers each including a cylinder (2) an intake valve (4) and an exhaust valve (5). A fuel injection unit injects fuel into the cylinder and an ignition unit ignites the fuel within the cylinder.

A controller (6) controls an operation of the intake valve, the exhaust valve, the fuel injection unit, and the ignition unit.

The controller executes a plurality of operation modes in accordance with a combination of one of the 4-cycle mode and the 2-cycle mode with one of a combustion ignition control and a self-ignition priority control. The combustion ignition control performs an ignition with the ignition unit at a predetermined timing before top dead center of the piston.

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At least one transition cycle upon switching of an operation mode of the engine between a first operation mode and a second operation mode is performed. The first operation mode being performed before the switching, the second operation mode being performed after the switching, and the transition cycle performing an operation of a same cycle type as the second operation mode under the combustion ignition control.

The transition cycle is different from the second operation mode in at least one of an intake valve opening timing, an intake valve closing timing, an exhaust valve opening timing, an exhaust valve closing timing, an injection quantity of the fuel, and an injection timing of the fuel.

The combustion ignition control is executed in one of the combustion chambers where a single cycle of the transition cycle is terminated until each of all the combustion chambers terminates a single cycle of the transition cycle irrespective of the second operation mode under one of the combustion ignition control and self ignition priority control.

Each of the transition cycle and the second operation mode has a period at which the intake valve and the exhaust valve are kept closed from closing of the exhaust valve to opening of the intake valve. The intake valve opening timing in the transition cycle is delayed from the intake valve opening timing in the second operation mode.

Claims 15 and 17 are rejected under 35 U.S.C. 102(e) as being anticipated by Denger et al.

The patent by Denger et al. (6,615,771) shows an engine with variable cycle switchable between a 4-cycle mode and a 2-cycle mode in which an area is defined by a required load and an engine speed. A first area (Fig. 1, SI top) is located where the required load is higher than a predetermined value. A second area is located where the required load is lower than the predetermined value (Fig. 1, SI bottom). A third area is located between the first area and the second area, where the engine speed is lower than a predetermined value (CI, middle left). A fourth area is between the first area and the second area where the engine speed is higher than a predetermined value (CI, middle right). A first operation mode is performed in the first area and the second area, the engine is operated in the 4-cycle mode under a combustion ignition control with an ignition unit at a predetermined timing before top dead center. A second operation mode is performed in the third area, the engine is operated in the 2-cycle mode under a self ignition priority control that executes one of the ignition without the ignition unit and the ignition with the ignition unit at a timing delayed from the timing under the combustion ignition control. A third operation mode is performed in the fourth area, the engine is operated in the 4-cycle mode under the self ignition priority control.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 5 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Otterspeer et al. in view of Denger et al.

The patent by Otterspeer et al. (6,619,241) does not show converting the cycles with a self ignition combustion. The patent by Denger et al. (6,615,771) shows the conversion of a 2-cycle stroke to a 4-cycle stroke with either a self igniting or a combustion igniting process. The patent by Denger et al. shows a first operation mode comprising the 2-cycle mode under the self ignition priority control, a second operation mode comprising the 4-cycle mode under the self ignition priority control, and an actual compression ratio in the transition cycle being higher than the actual compression ratio in the second operation mode.

The first operation mode can comprise the 4-cycle mode under the self ignition priority control. The second operation mode can comprise the 2-cycle mode and an actual compression ratio in the transition cycle is lower than the actual compression ratio in the second operation.

The first operation mode can comprise the 4-cycle mode under the combustion ignition priority control. The second operation mode can comprise the 4-cycle mode under the self ignition priority. The actual compression ratio in the transition cycle is lower than the actual compression ratio in the second operation mode.

The first operation mode can comprise the 4-cycle mode under the self ignition priority control. The second operation mode can comprise the 4-cycle mode under the combustion ignition control. An actual compression ratio in the transition cycle is higher than the actual compression ratio in the second operation mode.

***Allowable Subject Matter***

Claims 2-4, 6-10, and 12-14 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jason Benton whose telephone number is (571) 272-4838. The examiner can normally be reached on flex.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Henry Yuen can be reached on (571) 272-4856. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

JB

  
Henry C. Yuen  
Supervisory Patent Examiner  
Group 3700